CLAIMS

What is claimed is:

1. A method for automatically calibrating a color printing device, the method comprising:

performing a luminance calibration for at least one printing primary color; and

performing a combined luminance and chrominance calibration for at least one color comprising the at least one printing primary color.

2. The method as recited in Claim 1, wherein performing the luminance calibration includes performing a linearization parameter calibration.

3. The method as recited in Claim 2, wherein the linearization parameter calibration includes:

printing primary printing color test patches on a print medium;

measuring a luminance value associated with the primary printing color test patches;

comparing the measured luminance value with a defined reference value; and

modifying at least one linearization parameter based on the comparison.

4. The method as recited in Claim 3, wherein the linearization parameter is operatively associated with a one-dimensional look-up table.

5. The method as recited in Claim 1, wherein performing the combined luminance and chrominance calibration includes performing a color conversion parameter calibration.

6. The method as recited in Claim 5, wherein the color conversion parameter calibration includes:

printing color test patches on a print medium;

measuring luminance and chrominance values associated with the color test patches;

interpolating between the measured luminance and chrominance values based on defined reference values; and

modifying color conversion parameters based on the interpolation.

7. The method as recited in Claim 6, wherein the color conversion parameters are operatively associated with a multi-dimensional look-up table.

8. The method as recited in Claim 1, wherein performing the luminance calibration occurs prior to performing a combined luminance and chrominance calibration.

9. A color printing device comprising:

a color imaging module configurable to generate selected print commands;

a print mechanism operatively coupled to the color imaging module and configurable to print different test color patches in response to the selected print commands; and

a color sensing mechanism operatively coupled to the print engine and operatively configurable to measure luminance and chrominance values of the different test color pages, and

wherein the color imaging module is further configurable to be calibrated against a defined reference state by conducting:

a luminance calibration based on a comparison of the measured luminance and defined corresponding luminance reference values, and

a combined luminance and chrominance calibration based on a comparison of the measured luminance and chrominance and defined corresponding combined luminance and chrominance reference values.

10. The color printing device as recited in Claim 9, wherein the color imaging module further includes:

memory; and

logic operatively coupled to the memory and configured to:

perform the luminance calibration such that at least one linearization parameter stored in the memory is modified, and

perform the combined luminance and chrominance calibration such that at least one color conversion parameter stored in the memory is modified.

11. The color printing device as recited in Claim 10, wherein the linearization parameter is maintained in a 1-dimensional look-up table.

12. The color printing device as recited in Claim 10, wherein the color conversion parameter is maintained in a multi-dimensional look-up table.

13. A method for automatically calibrating a color printing device, the method comprising:

printing color test patches on a print medium;

measuring luminance and chrominance values associated with the color test patches;

interpolating between the measured luminance and chrominance values based on defined reference values; and

modifying color conversion parameters based on the interpolation.

14. The method as recited in Claim 13, wherein the color conversion parameters are operatively associated with a multi-dimensional look-up table.

15. A color printing device comprising:

a color imaging module configurable to generate selected print commands;

a print mechanism operatively coupled to the color imaging module and configurable to print different test color patches in response to the selected print commands; and

a color sensing mechanism operatively coupled to the print engine and operatively configurable to measure luminance and chrominance values of the different test color pages, and

wherein the color imaging module is further configurable to be calibrated against a defined reference state by conducting a combined luminance and chrominance calibration based on a comparison of the measured luminance and chrominance and defined corresponding combined luminance and chrominance reference values.

16. The color printing device as recited in Claim 15, wherein the color imaging module is further configurable to be calibrated against a defined reference state by conducting a luminance calibration based on a comparison of the measured luminance and defined corresponding luminance reference values.

17. The color printing device as recited in Claim 16, wherein the color imaging module further includes:

memory; and

logic operatively coupled to the memory and configured to:

perform the luminance calibration such that at least one linearization parameter stored in the memory is modified, and

perform the combined luminance and chrominance calibration such that at least one color conversion parameter stored in the memory is modified.

18. The color printing device as recited in Claim 17, wherein the linearization parameter is maintained in a 1-dimensional look-up table.

19. The color printing device as recited in Claim 17, wherein the color conversion parameter is maintained in a multi-dimensional look-up table.

20. A color printing device comprising:

color matching logic arranged to convert color image data from a first format to a second format using a programmable multi-dimensional data structure; and

calibration logic coupled to the color matching logic and configured to program the multi-dimensional data structure when

the color matching logic causes a printed color to deviate from an expected color.

21. The color printing device as recited in Claim 20, further comprising:

linearization logic coupled to the color matching logic and the calibration logic and configured to apply a programmable correcting value to at least a portion of the converted image data and output corrected image data, and

wherein the calibration logic is further configured to program the correcting value when the linearization logic causes the printed color to deviate from a reference color.

22. The color printing device as recited in Claim 20, wherein the calibration logic is configured to program the multi-dimensional data structure when measured luminance and chrominance values of the printed color significantly deviate from combined luminance and chrominance values of certain expected colors.

23. The color printing device as recited in Claim 21, wherein the calibration logic is configured to program the correcting value when a measured luminance value of the printed color significantly deviates from a luminance value of certain expected primary printing colors.

24. The color printing device as recited in Claim 20, further comprising:

a color sensing mechanism operatively coupled to the calibration logic and configured to determine a luminance value and a chrominance value of the printed color.

25. A tiered calibration method for use in a color printing device, the method comprising:

performing a first tier calibration based on measured luminance values from a test print, wherein if the measured luminance values are different than corresponding desired luminance values, then associated linearization parameters are modified to reduce the luminance value difference; and

performing a second tier calibration based on measured luminance and chrominance values in a subsequent test print, wherein if the measured luminance and chrominance values are different than corresponding luminance and chrominance desired values, then associated color conversion parameters are modified to reduce the luminance and chrominance value differences.